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Luisa Moreno, Ph.D, Analyst
lmoreno@jacobsecurities.com
+1 (416)866-8380

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Rare Earth Elements - Update

Rare Earth Economic War

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Introduction

Japanese, European and the U.S. officials met in Washington this month to discuss ways to cut demand and to find new resources of raw materials such as rare earths, which are crucial elements in the major growing sectors of their economies.

China produces more than 90% of global rare earths and in the last few years, it has been decreasing its output, citing resource depletion and environmental problems associated with the highly toxic rare earth processing industry. China has also decreased export quotas – in 2010, they were down by 40% compared to 2008. Japan, the U.S. and Europe have threatened to sue China over their rare earth policies in the World Trade Organization (WTO) court, which actually has no enforcement power. As the top economic powers are running out of ideas to persuade China to maintain a steady supply of rare earths, and at reasonable prices, they are trying to find ways to reduce consumption of critical metals and to develop a more robust and globally diversified industry.

The United States, Japan and Europe are looking for ways to reduce consumption of REEs while developing a more diversified global REE industry.

Although exports for 2011 are set to a volume similar to 2010, announcements that companies and local governments in China are gradually suspending production to comply with internal production quotas and to allow for environmental compliance reviews are making rare earth end-users outside China extremely nervous. However, they may be able to buy time if the global economy slows down further.

Prices of many rare earth elements have increased more than 1,700% in the last 2 years, but have fallen significantly in the last two month. We don’t believe that long term prices of common elements such as lanthanum and cerium will stay above $100/kg nor do we believe that prices will fall to $2/kg, unless other light elements such as neodymium stay at record elevated prices to cover the production costs of the light rare earth processors, which supply most of the rare earth market.

Given the dramatic fall in rare earths prices and the unstable state of the global economy, we have revised our forecast REE prices and updated the target prices for Avalon Rare Metals (TSX:MAT), Frontier Rare Earths (TSX:RES), Matamec Explorations (TSVX:MAT), Rare Element Resources (TSX:RES) and Ucore Rare Metals (TSX:AVL).

China

China is in a very comfortable position when it comes to rare earth resources. However, the environmental problems associated with the rare earth industry are real and China desperately needs to manage them. According to environmental sources, the rare earth industry in China produces 13 billion cubic meters of toxic gas and 25 million tons of wastewater every year, of which most over the years have been discharged into the local water systems without being treated. For instance, the Yellow River in China, from which about 150 million people depend on for primary water use, is believed to be contaminated. These toxicity levels are believed to be several times higher than the total annual pollution created from mines and oil fields in the United States.

Also important and perhaps the major focus for China, as it changes its rare earth mining and export policies, is the need to grow their manufacturing industry as a vehicle to employ the hundreds of millions of people that are currently seeking a spot in the fast-growing Chinese middle class. China intends to attract leading manufacturers by offering competitive rare earth prices to those that set up shop in mainland China. It is trying to persuade automotive companies, auto parts producers, battery manufactures and other companies that build REE-based devices and tech parts to move to China to help create jobs.

China has the resources and the know-how to economically separate and refine rare earth elements (from their deposits) at the purity and specifications required for the myriads of applications in the various sectors of the global economy. China has been doing this for decades and is the best at it. On the other hand, over the years, Japanese, European, Korean and American companies have developed rare earth-based technologies that are essential for the automotive industry and the renewable energy technologies, which are key pieces of the Chinese "green agenda".

Exhibit 1: The Rise of Chinese Workers

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Source: Google images

China has devised a very aggressive green agenda intertwined with its economic growth, industrialization and urbanization. In 2009, China was the largest investor in clean energy. The country has doubled its wind power capacity every year in the last five years and is now the world's largest producer of wind turbines. China is already the largest car manufacturer and hopes to become the leader in electric vehicles. China is not hiding its economic interest, and it has made it clear that it will continue pursuing industrial partners that are willing to build factories in China in return for easier access to rare earths.

Japan

Japan is the second-largest consumer of rare earths after China, and has inadequate industrial mineral resources. For decades the rest of the world have watched Japan miniaturize many devices, like cameras, computers, telephones, calculators, etc. The secret sauce in many of these technologies has been specialty metals such as the rare earth elements – and ingenuity, of course.

The Japanese economy is predominantly an export economy; it is highly dependent on most industrial metals, including copper, iron ore, alumina and all the rare metals. The manufacturing industry in Japan is a major component of its economy. Japan is the largest exporter of hybrid vehicles, and is a major producer of the many components utilized in electronic equipment and green energy devices. China is Japan's largest trading partner, followed by the U.S. However, in recent years, some Japanese companies have moved to China, following a trend from Western companies looking for cheaper labour and operating costs, and better access to a growing market.

Exhibit 2: Cellphone Evolution

Source: Google images

Japan is the largest manufacturer of hybrid vehicles, and a major producer of the many components utilized in electronic equipment and green energy devices.

Given the strategic importance to the Japanese economy, many companies in the automotive and electronics sector have resisted moving to China and those dependent on rare earth supplies are now running out of options. Some Japanese companies have chosen to use less rare earths in their products, thus compromising the near-term performance of their products, instead of moving to China and risking the integrity of their patents and local economy.

With so many rare earth projects around the world, some have wondered why Japanese companies aren't more active in collaborating or investing in Western rare earth projects. The Japanese have indeed been active but they are mostly collaborating and investing in countries that are currently producing rare earths, such as India, Brazil and Vietnam. The production capacity in these countries is not sufficient to close the current supply-demand gap, but aggregate production is expected to increase from less than 5,000 tonnes in 2010 to more than 20,000 tonnes in five years. However, if China maintains it policies and demand continues to grow, this additional production may not be sufficient, and because of the type of deposits in these countries, heavy rare earths elements (HREE) will likely still be in shortage.

The Japanese Geological Survey and associated companies have been busy in the past few years searching the world for rare earths. We believe they likely have a comprehensive database of all the significant rare earth occurrences currently known. However, they have certainly realized that identifying rare earth deposits is only the first step to commercializing these materials. Some rare earth deposits are found in politically unstable countries or non-friendly mining jurisdictions, some are in extremely remote places, while others by contrast are close to urban/populated zones. However, one of the most significant obstacles is the metallurgy, or the ability to economically recover and process the rare earth elements. The Japanese are excellent in applying rare earths to advance technologies, but they are no experts in the mining and separation of rare earths. China has been processing rare earths for many years, however, it also would face deep challenges processing some of the most complex rare earth ores currently known and owned by the various companies outside of China. Most of these deposits contain a combination of minerals that have not been commercially processed for the recovery of rare earths. As the various REE projects outside of China progress toward definitive feasibility studies, their commercial viability will become more evident, and we believe the Japanese companies, like Sumitomo, Hitachi Metals, Toyota and others, would get more involved. However, most projects are 4–6 years from production.

Only a few Japanese REE companies have moved to China.

Faced with tight REE supplies and high prices, some Japanese companies have moved to China. However, the companies that moved have mainly been those with relatively "simple" technologies, like producers of rare earth polishing products. Many of the leading Japanese manufacturers of rare earth products are, for the moment, taking an economic *kamikaze* position of not moving, although supplies are increasingly scarce. The Japanese government has recently announced subsidies to major motor manufacturers to aid them in their process of researching and adapting production lines to produce parts without rare earths. A desperate move that, if prolonged, could give China a technology advantage.

Japan is desperately looking for alternatives to rare earths; it has invested heavily in research to find substitutes and recycling technologies, however, most are not yet economic. It is also looking for near-term projects, which do not include the deep sea deposit in the pacific. As mentioned above, Japanese companies have invested in Lynas Corporation (ASX:LYC) and projects in India and Vietnam, which are likely to bring some relief in the short term. However, if the forecast demand growth of 10–15% for some of these elements is realized, the Western and African rare earth projects currently in development will be essential for the Japanese and world demand.

The United States

The U.S. was once the world's largest producer of rare earths.

The U.S. was once the main supplier of rare earths from the 1960s to the 1980s, and it has the third-largest rare earth reserves, according to the United States Geological Survey. However, from 1988 onward, China has held a firm grip on the world's REE supply, supported by its massive Bayan Obo deposit in Inner Mongolia, low labour costs and lax environmental regulations. The only producing rare earth mine in the U.S. to date has been Molycorp Minerals' (NYSE:MCP) Mountain Pass mine, where mining was halted in 2003 due to issues with toxic wastewater leaks, which have now been solved. Molycorp Minerals has been producing rare earth concentrate products from stockpiles and plans to re-start mining in 2012.

Although most of the REE can be produced from Mountain Pass, over the years Molycorp focused on only a few elements. In the 1950s and 1960s, europium and samarium were the main elements. Europium was in high demand when colour TVs were first introduced and samarium was used in samarium magnets, which have been substituted by neodymium magnets for most applications. Currently, Molycorp's main products are lanthanum and cerium concentrates, and praseodymium and neodymium mixed oxides. When the company completes the construction of the new processing facility it will likely add a few more products, which may include europium and samarium. However, we believe that Molycorp, based on its current business plan, may not be able to produce some of the most critical rare earth metals, as identified by the United States Department of Energy (i.e. terbium, dysprosium and yttrium). Challenging our view, Molycorp just announced that it has *rediscovered* HREE in its deposit. We believe that it may be associated with monazite, the radioactive thorium-bearing mineral, which may raise some eyebrows in the green state of California. Further, recovering REEs from monazite will likely require additional permitting, new metallurgical processes and funding.

HREEs, however, are found at relatively higher percentages at Ucore Rare Metals' (TSXV:UCU), Bokan Mountain property in Alaska. Rare Element Resources (TSX:RES), the owner of the Bear Lodge REE property, has also announced recently that it has high grades of heavy rare earth elements. However, both projects are at early stages of development and possibly 4–6 years from production. That means that the U.S. will stay highly dependent on China for some of these elements for a few years. In 2010, the U.S. accounted for 12% of the global rare earth consumption, and imported 70% of what it consumed, with 92% imported from China. The current rare earth situation is unnerving some government officials in Washington, particularly because some of these elements are used in military applications and are key to the U.S. green energy initiatives.

Ucore's Bokan Mountain deposits and Rare Element's Bear Lodge deposit could become future HREE sources for the U.S.

Exhibit 3: Mountain Pass

Source: Company reports

Currently, almost 50% of U.S. rare earth consumption is for catalyst applications, mainly for petroleum refinery and automotive catalytic converters. Lanthanum and cerium oxides are usually used in these applications. With Molycorp coming into production, the U.S. may become self-sufficient in these products by 2013. Only 8% of the rare earths consumed in America are used for permanent magnets. The U.S. used to have a vibrant magnet industry and rare earth research up until the 1990s when Magnequench, the then-largest REE magnet company in North America, moved to China. Since then, limited, if any, REE research has been carried out in America. There are only a few companies producing REE products in the U.S., including Electron Energy Corp, which produces samarium cobalt magnets; W.R. Grace and Co. (NYSE:GRA), which produces lanthanum and cerium compounds for fluid catalytic cracking (FCC) catalysts; and Aldrich-APL (NASDAQ:SIAL), which produces high-purity scandium oxide and scandium metal. Rare earths and other technology metals have become key in the development of high-tech devices. The U.S. is currently recruiting new scientists and engineers to rebuild its rare metals expertise and is searching for reliable and economic sources of REEs at home.

The U.S. is in the process of redeveloping its domestic rare industry.

European Union

Europe houses some of the leading rare earth product manufacturers, such as Treibacher Industrie and Rhodia Group. In fact, Rhodia has long set the standards for the purity and quality of rare earth compounds. Contrary to Japan, Europe actually has reasonable natural resources, such as copper in Portugal and Spain; iron ores, coal and natural gas in Germany; and a large rare earth deposit in Sweden — the Norra Karr deposit owned by Tasman Metals Ltd. Europe also houses two of the few rare earth processing facilities outside of China (e.g. Silmet plant, now owned by Molycorp).

Europe houses some of the leading rare earth processors and has large REE resources.

Europeans are traditionally pre-occupied with environmental issues, and Europe is usually seen as an unfriendly mining jurisdiction because of its heavy mining regulations and extensive permitting process. Europe is, however, awakening to the fact that many of the metals and minerals that are essential for its economy are increasingly scarce and often controlled by one or two countries, as is the case for the rare earths, niobium, PGMs, etc. European companies, particularly those in the aerospace, telecommunications and auto sectors, are facing severe competition for natural resources from emerging economies, like China and Brazil, which actually control many of the key industrial raw materials and are experiencing tremendous economic growth.

China, in particular, has become increasingly protective of its natural resources, and is continuously trying to control supply and prices of key raw materials, which led Mexico, the European Union (EU) and the U.S. to file a lawsuit against China at the WTO in 2009.

China's poor raw materials trading practises has prompted a lawsuit by Mexico, the U.S. and Europe.

The Swedish government has declared Tasman Metals' (TSXV:TSM) Norra Karr deposit as a strategic resource of "national interest", and a consortium of rare earth end users in Europe are closely monitoring the progress of the project. The project has the potential to generate significant volumes of all the major key rare earths elements, however, like many other projects, it is more than four years away from production. Also in the development stage are the collaboration between Rodhia and Areva Corporation (CVE:CEI) to develop deposits containing rare earths and uranium, and the research collaboration between French research institutes and Kazakhstan, which also has rare earth resources.

Exhibit 4: German Car Manufacturer

Source: Google images

Europe plans to stockpile REEs, despite the criticisms from some industry executives, who argue that Europe should instead focus on investing in mining projects and recycling technologies. We believe that Europe will stay strongly dependent on Chinese rare earth supplies in the near term.

The Rest of the World

China is not alone when it comes to rare earth resources; in fact, according to the United States Geological Survey, China only has one-third of the global resources, although it accounts for more than 90% of the total production. Other rare earth-rich countries include Canada, Brazil and India, and currently over 300 REE projects have been identified worldwide.

Canada, Brazil and East Asia have significant REE resources

India's estimated production in 2010 was 2,700 tonnes of REO, mostly from beach sand placer deposits. Main producers include India Rare Earth, which produces the HREE yttrium oxide, and Kerala Minerals and Metals. In the past two years, India's REE industry has received a great deal of attention, support and investments from government and private firms. However, the country's new mining bill act may hinder future investments.

Brazil may have the largest REE resources in the world.

Brazil's estimated production in 2010 was only 550 tonnes, but the country has significant rare earth resources that will likely be explored in the coming years. For instance, Neo Material Technologies (TSX:NEM) and Mitsubishi Corp. (TYO:8058) have plans to produce REE as a by-product of tin from the Taboca Pitinga mine and they may also be looking for other deposits with high amounts of heavy rare earths in Brazil. Advanced metallurgical tests are currently under way to determine if a REE by-product from the Taboca Pitinga mine is viable. Neo Materials and Mitsubishi are set to invest more than US$100 million for the development of a processing facility in Brazil, if the chemical processing is found to be economic. Also in Brazil are numerous REE-rich sand minerals that are currently being explored, and it has been suggested that the giant niobium Araxá mine in Brazil (operated by CBMM [Companhia Brasileira de Metalurgia e Mineração]) may also have rare earths, but a defined economic metallurgical process may be years away and the deposit contains mainly light rare earth elements (LREE).

China has 80% of the global heavy rare earth reserves.

China has 80% of the global heavy rare earth reserves and most are extracted from the ion adsorption clays found in Southern China. Chinese officials have announced that at the current production rate the resource lifetime is only 15 years, and for this reason China has set strict production quotas in that region. Ion adsorption clays can also be found in Lagos, Vietnam, Thailand and other neighbouring countries to Southern China. However, some of these clays do not contain the same high levels of heavy rare earths and/or economic size, others are positioned near economically important touristic areas or in challenging mining jurisdictions. The negative environmental impact of processing these valuable clays may also be an obstacle in some countries. Brazil may also have HREE-rich clays.

Canada also has large rare earth deposits with significant amounts of heavy rare earths. Avalon Rare Metals (TSX:AVL), Quest Rare Minerals (TSXV:QRM) have some of the largest heavy rare earth deposits in the world. Both projects are progressing steadily and they not only have rare earths, but also tantalum and other critical metals. However, they are still optimizing their metallurgical tests to obtain the lowest possible costs and are likely more than five years away from production. Matamec Explorations (TSXV:MAT) in Quebec also has a promising rare earth deposit. Although the size of their resource is relatively smaller than its peers named above, we believe this project is one of the most advanced based on the progress of its metallurgy. Also, as it has a unique eudialyte deposit, Matamec may become a low cost producer of HREEs. Furthermore, Matamec's capital costs are expected to be relatively low and given their progress, they could be one of the first companies to reach production.

In 2009, Malaysia's rare earth oxide production was estimated at 25 tonnes but is expected to increase. Lynas Corp. (ASX:LYC) is building a processing plant in the country. Although no official numbers have been reported, other countries believed to be currently exploring and likely producing REEs include Indonesia, Kazakhstan, North and South Korea, Kyrgyzstan, Mozambique, Nigeria, Russia and Vietnam.

Rare earth ores with monazite and xenotime minerals have been commercially processed to recover rare earths and are usually associated with yttrium and heavy rare earth elements. However, monazite is usually found with the radioactive element thorium, and xenotime is fairly rare and most xenotime-rich deposits tend to be small. Medallion Resources (TSXV:MDL) is actively pursuing ion adsorption clay deposits and brownfield monazite deposits to bypass the headaches of metallurgy that most rare earth companies are facing and reach production in record time, and cleverly so, in locations where thorium is being considered of potential economic value. In Australia, Northern Minerals (ASX:NTU) is exploring a unique xenotime deposit; yttrium and heavy rare earths account for about 80% of total rare earths.

Current producing mines, including those in India, Brazil and Molycorp in the United States, are going to be the main relief sources of rare earth oxides in the near term. However, in the long term, and assuming demand doubles in 10–15 years, many of the projects currently in development will be important sources of rare earths to avoid supply constraints.

Affected Sectors

Rare earths are a key component in the manufacturing of vehicles, computers and electronic devices. They are used in hydrogen fuel storage cells, special optical glasses, as doping agents in camera and telescope lenses, and in polishing glass and gemstones. Rare earths also have major applications in petroleum refining and as alloys for many different metals. They are major components in solar panels, LEDs, catalytic converters, carbon arc lighting, self-cleaning ovens, hardening agents and dental ceramics.

Rare earths are used in all major sectors of the world's economy including medicine, automotive, aerospace, computers, lighting and telecommunications.

Rare earths are used to make the world's strongest super magnets, which are present in hybrid cars, state-of-the-art wind and tidal turbines, industrial motors, air conditioners, elevators, microphones, loudspeakers, computer hard drives, in-ear headphones and guitar pick-ups. They are used as phosphors in all TVs and computer screens. The elements with the highest melting points, such as dysprosium and terbium, are used in nuclear control applications and to make the world's most heat resistant super magnets. They have medical applications in cancer treatment, arthritis and joint inflammation, in artificial joints, prosthetic devices and needles.

Exhibit 5: Selective REE applications

Source: Google images

In essence, rare earths are used in all major sectors of the world's economies, including medicine (drugs, implants, devices), automotive, aerospace, computers, lighting and telecommunications (e.g. smartphones, iPad). Rare earths are also key elements in many militarily applications.

Substitutes and Recycling

Can the world live without rare earths? Yes, surely, but many devices are likely to become somewhat bigger, heavier, slower and less efficient.

Scientists and engineers have been studying rare earths and trying to understand their characteristics since they were first discovered. Rare earth elements are mostly used in applications that exploit their unique properties; as such, substitutes are unknown or less effective. Rare earths may, in some applications, be substituted by other rare earths or more expensive alternatives, such as platinum group metals or other critical metals.

Many materials are recycled and rare earths are no exception. In fact, recycling of industrial metals has been an important factor to decrease resource depletion and in some instances to decrease energy demand and environmental impact.

However, as only small amounts of rare earths are usually used, the precision recovery of REE tends to be small and costly. However, with rare earth prices at an all-time high, the expensive, and sometimes environmentally hazardous REE recycling techniques may have become somewhat viable, and recycling costs could end up setting a price ceiling for some of the REEs. It has also been reported that engineers have been effective in optimizing the production lines to reduce careless waste of REEs during manufacturing, thus reducing consumption.

Prices

Rare earths prices have risen significantly in the last five years, driven by tight supplies from China and increased industrial demand. Furthermore, stockpiling by the major consuming countries and companies, and speculators entering the market to profit on price increases have contributed to additional demand and higher prices.

Operating costs in China are growing, which is driving REE prices up.

We believe that as China introduces tougher environmental and labour regulations, operating costs are likely to increase. If the Chinese authorities continue to tighten domestic production and restrict export quotas at current or lower levels, prices will stay above historical levels (before 2007). As the Chinese officials have noted many times, historical prices were irresponsible and are unrealistic. Currently, the challenge is to determine the real price of each element, which should be based on economic factors such as supply and demand, scarcity and production costs. We believe that current prices are probably too inflated and will likely fall further but stay above the 2009 levels.

Between 2007 and July of 2011 prices of some elements have gone up by 1000%.

Exhibit 6: Snapshot of Rare Earth Oxide Pricing

	2007	2008	2009	2010	Jan 2011	Jul 2011	06/10/2011
Lanthanum (US$/kg)	$3.10	$7.80	$5.90	$22.80	$61.25	$153.56	$79.00
Cerium (US$/kg)	$2.50	$4.40	$4.20	$21.30	$64.75	$156.88	$71.00
Praseodymium (US$/kg)	$28.00	$27.00	$15.20	$45.50	$93.31	$327.50	$262.50
Neodymium (US$/kg)	$29.00	$27.00	$15.30	$47.00	$92.13	$247.25	$218.50
Samarium (US$/kg)	$4.50	$4.50	$4.50	$16.50	$48.62	$128.50	$108.50
Dysprosium (US$/kg)	$85.00	$110.00	$105.00	$225.00	$325.00	$2,591.25	$2,290.00
Europium (US$/kg)	$300.00	$475.00	$465.00	$550.00	$630.00	$5,560.00	$3,790.00
Terbium (US$/kg)	$555.00	$650.00	$350.00	$530.00	$618.25	$4,260.00	$3,210.00

Note: Average annual prices for a ‘standard’ 99% purity of individual elements and for the generic composite of rare earth distribution.

Source: Lynas Corporation; Metal Pages; JSI

There is currently a price war between China and REE consuming countries, and China has the advantage.

There is currently a rare earth price war between China and consuming REE countries. Many Japanese companies held off buying REEs when prices peaked in July to record levels, which subsequently caused prices to decline. Chinese companies, however, seem to believe that current prices for some of the elements are fair and Baotou Hi-tech Corp. has recently announced that it will be buying praseodymium-neodymium oxides above Chinese market prices to keep prices elevated.

If the global economy slows further, speculators are likely to continue to exit the market and run to the dollar; at the same time, demand from Japan, the EU and other major consuming countries should ease, putting further downward pressure on prices. Current price fluctuations are certainly linked to the total demand for REEs, but as expected do not affect the financials of the companies currently developing rare earth projects, including Lynas. Also, we are fairly confident that all the preliminary studies and benchmark prices used in the valuations of developing rare earth projects do not use current or 2011 prices. As for Molycorp, its existing price contracts with suppliers were likely not affected by the frantic summer price increases; therefore, we don’t expect the current dramatic price declines to have an immediate effect on the company’s cash flows either.

However, we believe that Molycorp will face great resistance from end users who are not interested in paying the 2011 REE prices. We suspect that prices may have been a point of contention between Molycorp and Sumitomo when the financial and off-take deal broke off last month.

Prices of some elements have fallen 50% and may fall further if the global economy stays weak.

Rare earth prices plummeted in September and the biggest losers were the elements lanthanum and cerium. Prices have fallen from about $170/kg to $70/kg in three months, and according to *Metal-Pages*, some traders claim to have sold lanthanum and cerium for as low as $30/kg this month. Neodymium prices reached $321/kg in July but have fallen to $260/kg in October and may fall further this quarter. Elements such as terbium and dysprosium increased more than 250% between May and July, a simply ridiculous and certainly an unjustifiable price increase in a such short time. In May, terbium prices were $1,360/kg and $4,260/kg in July. Dysprosium increased from $798/kg in May to $2,551/kg in July. According to unofficial sources in China, in recent months as much as 90% of the miners and processors have halted production of heavy rare earths in Southern China. We believe that Chinese officials are committed to protecting their HREE resources and their policies will continue to put pressure on prices; however, if the global economic conditions stay murky, we expect prices this year to fall further but stay above 2010 levels.

Long Term Forecast

Our REE price forecast published at the beginning of June of 2011, showed a decline in long term prices. We thought that REE price increases were going to slowdown and reach a peak in late 2012 or early 2013, as Molycorp and Lynas are expected to ramp up production. Instead, prices accelerated in June and July and then fell dramatically. It seems that in 2Q2011, buyers were very active, perhaps stockpiling in anticipation of further export cuts from China in the second half of the year. In mid-July, when China announced that it was going to double the export quotas for 2H2011 compared to 2H2010, prices slowed down. At the same time, the global economy weakened driving further down demand and prices. Given the current economic climate and the recent dramatic changes in the rare earths prices we felt compelled to adjust our forecast. Exhibit 7, presents our long term forecast prices from 2014 to 2016, which is the expected period of production start for the most advanced rare earths projects.

Exhibit 7: JSI REE Price Forecast

	2007A	2008A	2009A	2010A	*2011F*	*2014F*	*2015F*	*2016F*
Lanthanum (US$/kg)	$3.1	$7.8	$5.9	$22.8	*$104.7*	*$28.5*	*$21.3*	*$16.0*
Cerium (US$/kg)	$2.5	$4.4	$4.2	$21.3	*$97.8*	*$26.6*	*$19.9*	*$15.0*
Praseodymium (US$/kg)	$28.0	$27.0	$15.2	$45.5	*$197.9*	*$88.7*	*$66.5*	*$63.2*
Neodymium (US$/kg)	$29.0	$27.0	$15.3	$47.0	*$235.0*	*$105.3*	*$79.0*	*$71.1*
Samarium (US$/kg)	$4.5	$4.5	$4.5	$16.5	*$107.3*	*$29.2*	*$21.9*	*$21.9*
Europium (US$/kg)	$300.0	$475.0	$465.0	$550.0	*$2,612.5*	*$1,687.7*	*$1,603.3*	*$1,603.3*
Gadolinium (US$/kg)	$10.5	$9.8	$6.5	$22.0	*$151.8*	*$77.9*	*$58.4*	*$43.8*
Terbium (US$/kg)	$555.0	$650.0	$350.0	$530.0	*$2,194.2*	*$1,864.9*	*$1,771.6*	*$1,683.1*
Dysprosium (US$/kg)	$85.0	$110.0	$105.0	$225.0	*$1,350.0*	*$984.2*	*$984.2*	*$984.2*
Yttrium (US$/kg)	$7.0	$15.0	$13.5	$26.3	*$143.1*	*$69.5*	*$52.1*	*$39.1*

Note: Average annual prices for a ‘standard’ 99% purity of individual elements and for the generic composite of rare earth distribution.
Source: Lynas Corporation; Metal Pages; JSI Estimates

Given the significant fall in prices of some elements in the last few weeks to levels close to those seen in late 2010 and a great deal of resistance from buyers to re-enter the market, we have lowered our long term prices for three of the top light rare earths: lanthanum, cerium and neodymium. As these elements are the most common ones, we should see an immediate increase in supply as new mines come into production. We expect lanthanum and cerium to fall below their average 2010 prices in the long term, and neodymium to fall but stay above its average 2010 price at about 70$/kg. We have increased the long term forecast prices for europium and terbium by more than 60%, as these two elements experienced significant price increases and are showing price resistance above 2,000$/kg. Europium and terbium are used as phosphors in all TVs, smartsphones, tablets and computer screens, they are also used in fluorescent light bulbs and alloys. Terbium is also used in the production of the high-heat resistant super-magnets. All these sectors are forecast to significantly grow in the next 5-10 years. We have incorporated the new prices into our models; the results are presented below.

Future Outlook

China has enough capacity to fulfill the current REE world demand. However, China has chosen the resource preservation path and we believe it is unlikely that it will flood the market anytime soon.

In the short term, potential sources of additional REE are likely to be the existing mines in India, Brazil, the Commonwealth of Independent States (CIS) and Vietnam. Japanese companies have invested in expansion projects in India, Vietnam and other nations, and are likely to see fruits of these investments in the next 12–24 months, but until then supplies will be tight and only a continuous economic slowdown would bring some relief.

The best rare earths projects are those that have advanced the most; with secured off-take agreements; with high levels of critical elements; and those of national or regional interest.

Rare earths can also be recovered as by-products, and many of the 300 rare earth projects currently under development could be compromised if a large deposit, such as the Baoton Obo deposit in China, from which most of the REOs are produced as by-products, is found outside of China and is developed in the next five years. The major hurdle is always finding an economic metallurgical process, but if that is somehow resolved it could quickly fill-up most of the demand gap. Under these circumstances, only the most advanced projects with high levels of critical elements with secured off-take agreements and those of national or regional interest will have a chance to reach production. Included in this group are Rare Element Resources and Ucore Rare Metals, both companies with heavy rare earth elements in the United States and likely of strategic interest to the U.S.; and Tasman, the only rare earth deposit in the EU, with one of the highest HREE levels in the world. Also in a strong position is Frontier Rare Earths (TSX:FRO). Its Zandkopsdrift deposit has a favourable rare earth distribution with high levels of critical elements. Frontier is only a few months away from closing an off-take agreement with Korea Resource Corporation and it fits well with the rare metals strategic initiative under development in South Africa. Another project that will likely be developed is Matamec's Kipawa deposit, which has high levels of HREE, and preliminary metallurgical tests indicate that production costs would likely be competitively low. We believe that Matamec is a strong takeout or JV target for Molycorp, Neo Materials, Great Western Minerals (TSXV:GWG), and European and Japanese end users.

In the long term, assuming the global economy recovers and the emerging economies continue to expand, we believe that demand for rare earths may double and large rare earth deposits, such as those owned by Avalon and Quest with significant percentages of some of the most critical elements could become instrumental sources of REE if they are able to develop economic processes. Rare earth applications will likely boom for the foreseeable future as the developed nations increase their recruiting efforts in this space and continue to invest heavily in research and development. Even obscure elements like thulium and lutetium would likely be in greater demand if a large heavy rare earth deposit such as Avalon's come into production to provide a sustainable source of these rare super elements.

China will likely continue to dominate the rare earth market, until a more geographically diversified industry is developed.

Rare earth prices are likely to fluctuate and stay high as long as China is the major producer, however, when Lynas and Molycorp initiate production, and expansion projects in India, Vietnam and Brazil are completed, prices will certainly fall but stay above the mid-2000 values.

We believe that China will continue to dominate the rare earth market, as it will likely continue to be the lowest-cost producer and the largest consumer for many years. We anticipate that Chinese HREE exports will lessen over time and China will become a net importer of rare earths in 5–8 years. Light deposits with high grades of critical elements and high tonnage, and deposits with high percentages of heavy rare earths could become significant sources of HREEs, and will likely be closely watched by the U.S., Europe and Japan.

It is unlikely that China will change its policies.

For now, China is not likely to change its position and Japan, the U.S., Europe and the rest of the world will have to adapt by finding ways to recycle REEs, using less efficient substitute materials and by investing in new manufacturing processes to optimize use, while developing projects around the world.

Rare Earth Coverage – Target Prices and Recommendations

We updated our models to incorporate the forecast prices presented earlier. Exhibit 7 summarizes our recommendations. We maintained a discount rate of 15%. The price targets were all derived from the estimated Net Asset Value (NAV) of each company multiplied by a P/NAV multiple. The company specific multiples were selected based on the development stage of the project, the resource size and rare earth distribution. We exclude five heavy rare earth elements (holmium, erbium, thulium, ytterbium and lutetium) from our valuations because the market for these elements is fairly small and for a lack of price information.

Exhibit 8: JSI REE Price Forecast

Company	Ticker	Rating	Share Price (C$)	Target (C$)	Market Cap (C$ mln)	NAVPS (C$)	P/NAV	Target P/NAV	Implied return
Matamec	TSXV:MAT	Spec. Buy	0.29	1.50	34.1	3.76	0.08x	0.40x	417%
Rare Element Res.	TSX:RES	Spec. Buy	5.88	11.34	259.3	16.2	0.36x	0.70x	93%
Ucore	TSXV:UCU	Spec. Buy	0.50	0.76	75.4	1.27	0.39x	0.60x	52%
Frontier	TSX:FRO	Spec. Buy	0.90	5.90	80.6	14.75	0.06x	0.40x	556%
Avalon	TSX:AVL	Spec. Buy	3.43	6.06	352.0	8.65	0.40x	0.70x	77%
Average							**0.26x**	**0.56x**	**239%**

Valuation date: 14-Oct-11
Source: JSI Estimates; Capital IQ

The average P/NAV multiple of our universe of companies have fallen by 50% in the last four months. We believe that rare earths stocks have been affected by the following: (i) a dramatic fall in REE prices associated with the apparent low demand and resistance from well stocked buyers to purchase REEs; (ii) annoucements/rumors about increase recycling of rare earths; and (iii) the threat that large mining companies such as Vale S.A. (NYSE:VALE) and CBMM could enter the market within 5 years, aggravated by the general economic weakness and poor equity markets. We expect the overall equity markets to stay highly volatile as the sovereign debt issues in Europe are likely to continue to surface until a viable solution is found, and given the current political climate in the U.S. it seems unlikely that major economic policies will be implemented in the next few months. As the western economies struggle, China and other emerging economies are likely to also slowdown, as demand for their products decrease. That is likely to have a negative effect in the overall commodity markets as well. Given the current economic situation and increase risk in the sector we have lowered the target P/NAV multiple for our coverage universe to 0.56x, down from 0.75x.

As expected the decrease in long term forecast prices for the light rare earth elements had a more noticeable effect on the companies with higher percentage of LREE, such as Rare Element Resources and Frontier, but a somewhat neutral effect on the basket prices for Matamec and Ucore, due to higher forecast prices for some of the HREEs. We maintain the P/NAV target of 0.4x for Matamec, as the company has made a significant progress in their metallurgy and in anticipation that they will be releasing the Preliminary Economic Assessment for the Kipawa project later this month. We lowered our target price for Rare Element Resources, Ucore Rare Metals, Frontier Rare Metals and Avalon Rare Metals by adjusting REE prices, net recovery rates and lowering the target P/NAV multiples.

With the exception of Matamec, all the other companies have experienced project delays and we now expect their PEA and PFS to be published in 1Q2012. We are, however, expecting further metallurgical work updates from Rare Element and Ucore before the end of the year, which will further differentiate them from the other REE projects. As Frontier and Avalon have not been able to report the gradual progress of their metallurgical test, we have reduced the forecast net recovery rate from 70% to 67% for Frontier and from 74% to 67% for Avalon, which caused a decrease in future output and NAV. We believe that the valuations for this group of REE companies are attractive, and are a good entry point for those investors with long-term time horizons and a high risk tolerance.

Avalon Rare Metals Inc. (TSX:AVL; C$2.77)

Avalon Rare Metals Inc. engages in the development and exploration of rare metals and minerals in Canada. The company primarily explores for lithium, tantalum and niobium, indium, gallium and rare earth elements, such as neodymium and terbium, and rare minerals, including calcium feldspar. It holds interests primarily in the Thor Lake rare metals project located in the Mackenzie mining district of the Northwest Territories; the Separation Rapids lithium project, the Lilypads Lakes tantalum project and the Warren Township Calcium Feldspar project, both in Ontario; and the East Kemptville tin-indium-gallium-germanium project in Nova Scotia.

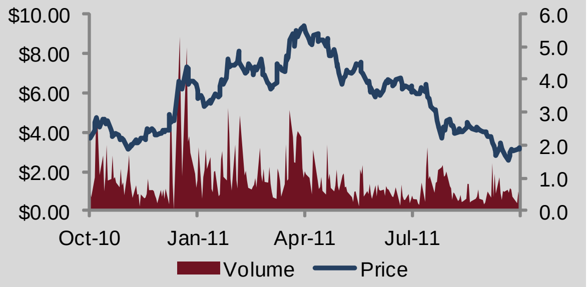
- Avalon owns 100% of the Nechalacho rare earth element deposit located at Thor Lake, Northwest Territories, one of the largest rare earth (plus zirconium, niobium, tantalum) deposits in the world.
- In the high grade Basal zone part of the deposit, indicated mineral resources were estimated at 57.49 million tonnes with 1.56% TREO and a 0.21 HREO/TREO ratio; inferred mineral resources were estimated at 107.59 million tonnes with 1.35% TREO and a 0.19 HREO/TREO ratio (January 27, 2011). Avalon has good yttrium grades and the rare earths distribution favours the HREE. In our model, we assume a 0.3 HREO/TREO ratio in the first few years, based on recent drilling results.
- Avalon was the first Canadian-listed rare earth company to publish a PFS for a rare earth project. Based on the report, there is the potential to develop an underground mine with an 18-year mine life. Our model uses the production parameters defined in the PFS and incorporates a refinery facility to separate and refine the individual elements.
- We estimated a capital cost of C$1.2 billion, which on a per-contained resource basis, is actually lower than most of Avalon's peers.
- Avalon expects to produce tantalum, niobium and zirconium as by-products. We estimate that by-product revenue would account for approximately 20% of sales, covering a significant percentage of the costs.
- We maintain our Speculative Buy recommendation but we have lowered our target price from C$10.12 to C$6.06. Our target price is based on a NAVPS of $8.65 applied to 0.7x P/NAV multiple. We have decreased the net recovery rate to reflect increased metallurgical process risk and lowered P/NAV.

1-Year Target Price	**$6.06 ↓**
Prior	*$10.12*
1-Year ROR	**119%**

($ mm except per share data)

Share Price	$2.77
52 Week High	$9.65
52 Week Low	$2.44
Shares Outstanding (Basic)	102.56
Shares Outstanding (Dilluted)	112.84
Market Cap	$284.1
Net Debt	(73.40)
Cash & Short Term Investments	$73.40
Debt	$0.0
Total Enterprise Value	$210.69
NAVPS	$11.25
P/NAV	0.41x
EV/Resource Contained	$170

Price/Volume Chart



Project Details

Name	Thor Lake (Nechalacho)
Location	Thor Lake, NW Territories, Canada
Stage of Production:	Feasibility
Size of Property	4,250 ha
Type of Ore	Syenite
NI 43-101 (or equivalent)	Yes
Average TREO or TREE	1.43% TREO
Resource's Principal REEs	15.2% La, 34.2% Ce, 4.3% Pr, 17.1% Nd, 3.8% Sm, 3.2% Dy
Average Grade of Other Principal By-products	Nb_2O_5, ZrO_2
Off take agreement	n/a
Target Production (year)	2015
Target Production (tonnage)	15,000 tpa TREO
Resource	
Measured	n/a
Indicated	21.4 Mt at 1.64% TREO
Inferred	182.6 Mt at 1.40% TREO
Ownership	100.0%

Frontier Rare Earths Ltd. (TSX:FRO; C$1.05)

Frontier Rare Earths Limited is a Luxembourg headquartered, mineral exploration and development company that is exclusively focused on rare earth elements. Frontier was incorporated in 2002 with the objective of developing a portfolio of mineral exploration projects in Southern Africa. The company's principal asset is the Zandkopsdrift rare earth deposit in the Namaqualand region of the Northern Cape Province of South Africa.

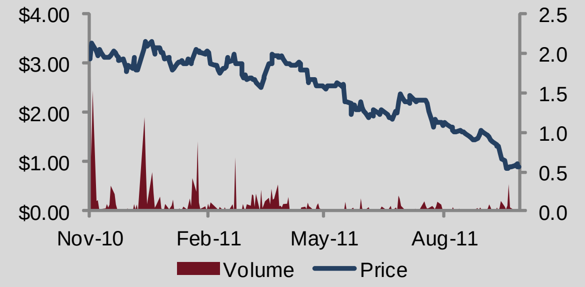
- Frontier's Zandkopsdrift property is currently the largest NI 43-101 compliant rare earth resource in Africa, and one of the largest in the world. Estimated resources amount to 43.7 million tonnes at an average grade of 2.16% and a 1% cut-off grade. Our economic model is based on a 20-year mine life, based only on the size of the indicated resources (22.9 million tonnes); the mine life could be extended further, based on the existing resource which remains open laterally and at depth.
- The property is located near infrastructure and the total capital cost per tonne is expected to be lower compared to its peers in North America.
- Frontier's resource size and consequent expected production level (20,000 tonnes) combined with a unique rare earths distribution means that the company could produce more volume of the critical elements (neodymium, praseodymium, dysprosium, europium and terbium) than some of the more advanced juniors with higher percentages of HREO/TREO but lower TREO production.
- Frontier Rare Earths, Ltd. announced that it signed an initial agreement with Korea Resources Corp. (Kores), which gives Kores the option to acquire up to 20% interest in the Zandkopsdrift - an initial 10 % interest upon completion and publication of the preliminary economic assessment (PEA) scheduled for 1Q 2012; and an additional 10% upon completion of the bankable feasibility study (BFS) estimated for Q4 2012.
- With a 20% investment, Kores will have the right and obligation to purchase 20% of the rare earth production from Zandkopsdrift. Kores will also contribute, pro rata to its equity interest (20%) to all the costs and expenses to develop and operate Zandkopsdrift, and provide technical and operational assistance.
- We believe Frontier is severely underpriced compared to its peers. The company is currently trading at 0.09x P/NAV compared to 0.26x for the peer group.
- We maintain our Speculative Buy recommendation for Frontier but we have lowered our target price of C$9.83 to C$5.90 based on a lower multiple of 0.4x applied to a lower NAVPS estimate of C$14.75.

1-Year Target Price	**$5.90 ↓**
Prior	*$9.83*
1-Year ROR	**462%**

($ mm except per share data)

Share Price	$1.05
52 Week High	$3.75
52 Week Low	$0.91
Shares Outstanding (Basic)	89.56
Market Cap	$94.04
Net Debt	(50.00)
Cash & Short Term Investments	$50.00
Debt	$0
Total Enterprise Value	$44.04
NAVPS	$16.39
P/NAV	0.12x
EV/Resource Contained	US$156

Price/Volume Chart



Project Details

Name	Zandkopsdrift
Location	Cape Province, South Africa
Stage of Production	Scoping study
Size of Property	58,862 ha
Type of Ore	probably supergene, monazite and crandallite
NI 43-101 (or equivalent)	yes
Average TREO or TREE	2.16% REO @1% cut-off
Resource's Principal REEs	44.17% Ce, 25.42% La, 4.55% Pr, 15.77% Nd, 2.32% Sm; 4.07% Y
Average Grade of Other Principal By-products	n/a
Off take agreement	n/a
Target Production (year)	2015
Target Production (tonnage)	20,000
Resource	
Measured	n/a
Indicated	22.9Mt @ 2.32% TREO
Inferred	20.8Mt @ 1.99% TREO
Ownership	74% (Direct) 95% (Economic Interest)

Matamec Explorations Inc. (TSXV:MAT; C$0.29)

Matamec Explorations Inc. engages in the exploration and development of mining properties in Canada. The company's main project is the heavy rare earth-yttrium-zirconium Kipawa deposit, Zeus property in Quebec. The company also explores for gold deposits, platinum group elements, base and precious metals, and rare metals. The company's property portfolio includes Montclerg, Matheson-Colbert and Matheson-Explorers properties in Ontario, and Sakami, Tansim, Valmont, Vulcain and Lesperance/Wachigabau properties in Quebec. It also holds 50% interest in the Matheson-Pelangio property, and a 25% interest in the Matheson joint-venture property. Matamec Explorations Inc. was incorporated in 1997 and is headquartered in Montreal, Canada.

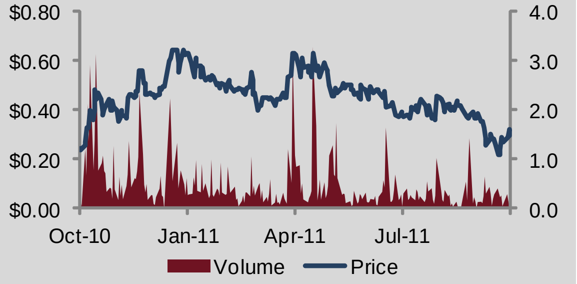
- Matamec's Kipawa deposit at the Zeus property is located near infrastructure and the preliminary mine plan outlines an open pit approximately 1,200 m x 50 m x 50 m. At full production, we estimate a plant throughput of 1,795 tonnes per day (tpd) and production of about 3,000 tonnes of TREO.
- Estimated mineral resources amount to 24.46 million tonnes at an average grade of 0.44% TREO. The percentage of HREO/TREO is 39.4%.
- The main REE mineral in the Kipawa deposit is eudialyte, derived from the Greek word *Eu*, which means well, and *dialytos*, which means dissolved, referring to its easy solubility in acid. We estimate that Matamec's unit cost on a per-tonne basis would be one of the lowest in this sector.
- Matamec has made significant progress with the metallurgy testing. The company has produced a leached solution rich in rare earth oxides, using a simple and economic two-step method of magnetic separation followed by a proprietary leaching process, and it has been able to completely precipitate out the rare earths to produce a mixed REO concentrate. This is a significant progress for Matamec, and it is the closest that any junior rare earth company has been to commercialization.
- We expect Matamec to disclose more specific details about the expected percentage of REO concentration in the coming weeks leading to the Preliminary Economic Assessment, due in October 2011.
- We maintain our Speculative Buy recommendation and target price of C$1.50. Our valuation is derived using a P/NAV multiple of 0.40x on a NAVPS of C$3.76.

1-Year Target Price	**$1.50**
Prior	*Unchanged*
1-Year ROR	**417%**

($ mm except per share data)

Share Price	$0.29
52 Week High	$0.70
52 Week Low	$0.24
Shares Outstanding (Basic)	117.3
Market Cap	$34.0
Net Debt	-$6.0
Cash & Short Term Investments	$6.0
Debt	$0.0
Total Enterprise Value	$28.0
NAVPS	$3.83
P/NAV	0.08x
EV/Resource Contained	$272

Price/Volume Chart



Project Details

Name	Zeus Property (Kipawa Deposit)
Location	Quebec, Canada
Project Stage	Scoping Study
Size of Property	15,244 ha
Type of Ore	peralkaline syenite and granite
NI 43-101 (or equivalent)	Yes
Average TREO or TREE	0.42% REO @ 0.2% cut-off
Resource's Principal REEs	13.5% Nd, 3.7% Dy, 22.4% Y, 14.16% La, 29.3% Ce
Average Grade of Other Principal By-products	0.944% ZrO2 at 0.016% DyO3
Off take agreement	n/a
Target Production (year)	2015
Target Production (tonnage)	3,000-5,000 TREO tonnes per year
Resource	
Measured	n/a
Indicated	17.65Mt @ 0.44% TREO
Inferred	6.81Mt @ 0.37% TREO
Ownership	100%

Rare Element Resources Ltd. (TSX:RES; C$5.40)

Rare Element Resources Ltd. engages in the acquisition, exploration and development of mineral properties in Canada and the United States. The company is focused on rare earth elements and gold. It holds a 100% interest in the Bear Lodge property located in northeast Wyoming. Rare Element Resources Ltd. was incorporated in 1999 and is based in Vancouver, Canada.

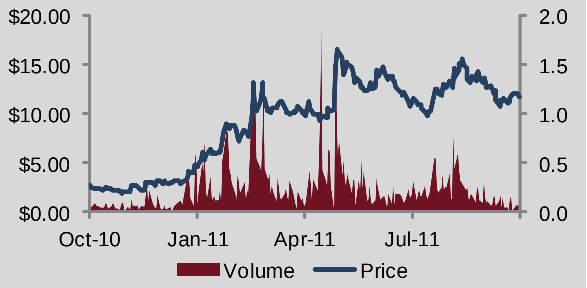
- Rare Element Resources owns the Bear Lodge property, which contains significant high-grade REE in carbonatite dikes as well as gold mineralization. This deposit is one of the largest deposits of disseminated rare earth elements in the United States. Estimated mineral resources amount to 22.71 million tonnes at an average grade of 3.16% TREO.
- Rare Element is one of the few junior rare earth exploration companies to have completed a scoping study. The company expects to complete the pre-feasibility study in 1Q 2012.
- Rare Element has one of the highest grades of critical materials (excluding yttrium) in North America. The company has completed phase 1 metallurgical tests, which show that a recovery rate of 80% – 85% REOs is possible using a two-stage process: first the physical upgrading and then a chemical leaching process to produce a mixed rare-earths leachate that is precipitated as a concentrate. The pilot plant study is underway and the company expects it to be completed before the end of 2011.
- The company's metallurgy results are positive and indicate that it has a relatively simple metallurgy compared to many of its competitors, which places it in a favourable position as it moves towards production.
- Rare Element has identified three areas in the Bear Lodge property with high grades of heavy rare-earth elements: Whitetail Ridge, East Taylor, and Carbon. The areas are well outside Bull Hill, the main exploration target, thus increasing the potential for resource expansion of the property.
- The property has well-developed surrounding infrastructure. The mine plan is for an open-pit mine. We estimate that the company will be producing at full ramp up, an average of 11,000 tonnes of REO. The production is projected to start in 2015.
- We maintain our Speculative Buy recommendation but we have lowered our target price of C$18.43 to C$11.34 based on a lower P/NAV of 0.7x applied to estimated NAVPS of C$16.20.

1-Year Target Price	**$11.34 ↓**
Prior	*$18.43*
1-Year ROR	**110%**

($ mm except per share data)

Share Price	$5.40
52 Week High	$17.85
52 Week Low	$1.94
Shares Outstanding (Basic)	43.2
Market Cap	$489.5
Net Debt	-$74.0
Cash & Short Term Investments	$74.0
Debt	$0.0
Total Enterprise Value	$418.1
NAVPS	$18.43
P/NAV	0.29x
EV/Resource Contained	US$387

Price/Volume Chart



Project Details

Name	Bear Lodge
Location	Crook County, Wyoming, US
Project Stage	Pre-feasibility
Size of Property	971 ha
Type of Ore	Carbonatite and alkaline
NI 43-101 (or equivalent)	Yes
Average TREO or TREE	3.46% REO @ 1.5% cut-off
Resource's Principal REEs	16.8% Nd, 4.8% Pr, 45.0% Ce, 29.3% La
Average Grade of Other Principal By-products	n/a
Off take agreement	n/a
Target Production (year)	2015
Target Production (tonnage)	11,400 TREO tonnes per year
Resource	
Measured	n/a
Indicated	n/a
Inferred	17.5Mt @ 3.46% REO
Ownership	100%

Ucore Rare Metals Inc. (TSXV:UCU; $0.47)

Ucore Rare Metals Inc. engages in the exploration and development of rare earth element and uranium properties. The company's principal property is the Bokan Mountain/Dotson Ridge property, which is located on the southern part of the Prince of Wales Island in South-Eastern Alaska. It also has properties in Nunavut, in Stephenville, Newfoundland, and in Labrador. Ucore Rare Metals Inc. is based in Halifax, Canada.

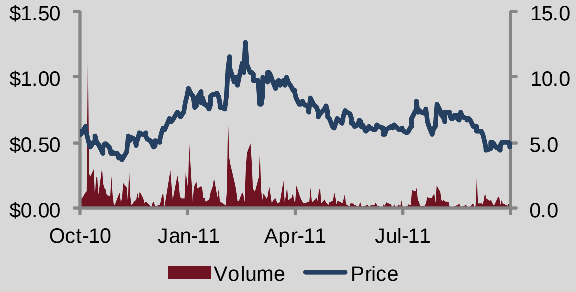
- Ucore's 100%-owned Bokan Mountain property covers 30 sq. km (19 sq. miles) and includes the former high-grade Ross Adams Mine, which is Alaska's only prior-producing uranium mine (1958–1971).
- The Bokan deposit has been identified by the USGS as the most significant heavy rare earth deposit in the United States. The NI 43-101 compliant resource for the Bokan area is estimated at 3.7 million tonnes at 0.75% TREO, at a cut-off grade of 0.5%. The percentage of HREO/TREO is estimated at 39%.
- The Ucore project has attracted significant attention from state and federal governments in the United States, given its relatively high percentage of heavy rare earth elements, identified as critical for the energy and defense industries.
- The company's relatively small project size and estimated capital cost are potentially advantageous for the company given the somewhat lower financing risk. The company is currently working toward the completion of a scoping study, expected to be completed in 1Q 2012.
- Ucore has been able to validate and improve the historical metallurgical tests previously directed by the U.S. Bureau of Mines. The tests were performed on samples from the Dotson Zone, Ucore's principal economic target. The second phase of the metallurgical test work is expected to focus on further reducing operating costs and establishing a process flow sheet for the pilot plant study. We expect Phase 2 to be completed in the next 3 to 6 months.
- Our valuation is based on a 10-year mine life, with a plant throughput of 1,014 tpd and 2,100 tonnes of rare earth oxide production per year. We maintain our Speculative Buy recommendation but we have lowered our target price to C$0.76 based on a NAVPS of C$1.27 applied to a 0.6x P/NAV multiple. We have lowered the P/NAV multiple to adjust for the higher sector risk.

1-Year Target Price	**$0.76 ↓**
Prior	*$1.09*
1-Year ROR	**63%**

($ mm except per share data)

Share Price	$0.47
52 Week High	$1.28
52 Week Low	$0.36
Shares Outstanding (Basic)	150.86
Market Cap	$70.15
Net Debt	-$12.07
Cash & Short Term Investments	$12.07
Debt	$0
Total Enterprise Value	$58.08
NAVPS	$1.28
P/NAV	0.36x
EV/Resource Contained	US$1,881

Price/Volume Chart



Project Details

Name	Bokan Mountain
Location	SE Alaska, U.S.
Stage of Production	Discovery Delineation
Size of Property	3,000 ha
Type of Ore	Peralkaline
NI 43-101 (or equivalent)	No
Average TREO or TREE	0.75% REO @0.5% cut-off
Resource's Principal REEs	25% Y, 3.9% Dy, 3.62 Gd; 14.5% Nd; 29.5% Ce; 10.3% La
Other Principal By-products	n/a
Off take agreement	n/a
Target Production (year)	2015
Target Production (tonnage)	3000
Resource	3.7 Mt @ 0.75% REO
Ownership	100%

Rare Earth Elements Investment Risk

The most common investment risks associated with the companies in this report are listed below, some apply to all the companies in the mining sector and some risks are REE sector specific.

Exploration Risk: The market may price in successful preliminary drilling or trenching results, which a comprehensive exploration work may not confirm. A company's share may fall in these situations.

Financing Risk: With many projects at similar levels of development, the competition for financing will likely rise in the coming years. Tight credit markets will make it difficult to raise funds and will most likely lead to project delays and cancelations. During the funding process, equity dilution may occur.

Geopolitical Risk: Companies with assets in the developing countries are usually assumed riskier, given the often less stable political environments. However, companies in developed countries can also be affected by changes in governments and policies that may, for instance, affect tax and permitting laws. Some projects in North America are under the jurisdiction of First Nations groups, which often involve high levels of negotiations and approvals.

Rare Earth Distribution Risk: The rare earths, which comprise 14 lanthanides plus yttrium and occasionally scandium, are usually found together. However, the percentage of each element is usually different in different minerals and deposits. During production, variations in the distribution of each element should be expected, however, significant changes may affect processing cost and revenue.

Price Risk: Prices of individual rare earth elements would have a different effect on valuations of the individual projects given that they have different distribution of rare earth elements in their deposit. For example, changes in HREE prices would have a more significant effect on the valuation of companies that have deposits with higher percentages of HREE. Also, the relative difference in prices between the various elements could affect future revenue and valuations.

Metallurgical Process Risk: Although there are over 200 minerals that host REE, only about five of them have been commercially processed. Many REE projects are dealing with minerals that were never before economically processed for REE production.

Currency Risk: International REE prices are priced in U.S. dollars; as such, companies operating outside of the U.S. will be affected by changes in the exchange rate between the dollar and their functional currency.

Acquisition Risk: We believe that consolidation of the industry is imminent. Also, some of the REE miners may attempt to acquire upstream players to vertically integrate. In a highly competitive market, some companies may overpay for assets.

Companies Mentioned in This Report

CVE:CEI	Areva Corporation
NASDAQ:SIAL	Sigma-Aldrich Corporation
TSX-V:AVL	Avalon Rare Metals Ltd.
	CBMM
TSX:FRO	Frontier Rare Earths Ltd.
TSX-V:GWG	Great Western Minerals Group Ltd.
TYO:5486	Hitachi Metals Ltd.
ASX:LYC	Lynas Corporation
TSX-V:MAT	Matamec Explorations Inc.
TSX-V:MDL	Medallion Resources Ltd
NYSE:MCP	Molycorp Minerals Inc.
TSX:NEM	Neo Material Technologies Inc.
ASX:NTU	Northern Minerals Inc.
TSX-V:QRM	Quest Rare Minerals Ltd.
TSX-V:RES	Rare Element Resources Ltd.
	Rodhia Group
TYO:8316	Sumitomo Corporation
TSX-V:TSM	Tasman Metals Ltd.
NYSE:TM; TYO:7203	Toyota Motor Corporation
	Treibacher Industrie
NYSE:GRA	W.R. Grace and Co.
	India Rare Earth
	Kerala Minerals and Metals
TSXV:UCU	Ucore Rare Metals Inc.
NYSE:VALE;SAO:VALE5	Vale S.A.

Acronyms

CIS	Commonwealth of Independent States
HREE	Heavy Rare Earth Element(s)
JSI	Jacob Securities Inc.
JGS	Japanese Geological Survey
LCM	Less Common Metals Ltd.
LREE	Light Rare Earths Element(s)
PEA	Preliminary Economic Assessment
PFS	Preliminary Feasibility Study
REE	Rare Earth Element(s)
REO	Rare Earth Oxide(s)
TREE	Total Rare Earth Element(s)
TREO	Total Rare Earth Oxide(s)
USGS	United States Geological Survey
WTO	World Trade Organization

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Buy: Anticipate total return appreciation generally in excess of 15% over the next 12 months.
Speculative Buy: Anticipate total return appreciation generally in excess of 25% over the next 12 months, however, the company is either pre-revenue, has negative cash flow, or a major unpredictable event may occur within 12 months.
Hold: Anticipate limited total return (general appreciation less than 15% [or 25% for speculative rated stocks] or decline less than 10%) over the next 12 months.
Reduce: Near term price outlook is for a negative return; however the long term outlook is for a positive return.
Sell: Near term and long term return is expected to be negative.

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High: High financial and or operation risk, low predictability of financial results, high stock volatility.

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